No. 37. 1936.

Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

Bulletin

of the seismological station

KØBENHAVN

$\varphi = 55°41'$ N. $\lambda = 12°27'$ E. $h = 13$ m.

Lithologic foundation: chalk.

No. 37. Jan.—March 1936.

Instruments:

Galitzin-Wilip seismographs:

Constants:

Component	l	A_1	T_1		μ^2	T	k
	cm	cm	sec			sec	
N	12.5	100	12.61		—0.1	12.4	104
E	12.5	100	12.65		0.0	11.9	104
Z	14.5	100	11.55	$^1/_1$—$^{26}/_2$	0.1	9	90
				$^{26}/_2$—$^{31}/_3$	0.0	10	95

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component	T	ν	ϱ	V
	sec		mm	
N	9.3	4.0	0.6	215
E	9.3	3.9	0.7	190
Z	5.4	4.1	0.2	170

Milne-Shaw seismograph, E component, with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.

Wood-Anderson torsion seismometer, E component, $T = 2^s.7$.

BIANCO LUNOS BOGTRYKKERI A/S
KØBENHAVN

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No.	Date	Hour	Forerunners P	Forerunners S			L	Un-defined	△	Remarks
	1936 Jan.		m s	m s	h m s	m s	h m	h m	°	
							12			
1	1	4							25	*P*+. Spitsbergen.
2	2	0	*i*42 32	*i*46 54	43 52	46 5				Forerunners masked by microseisms.
3	2	17					1.3			
4*	2*	22	*i*47 16	*i*57 56	63.8	68.0	1.2			Sumatra.
5	6	4					.3			
6	14	6			6.5	12 8	.4			*e* 17m.4. South Atlantic. Masked by
7	14	7					.6			[strong microseisms.
8*	14*	14			*i*35 11	*i*35 58				Argentina.
9	14	15					22			Masked by strong microseisms.
10	14	18					.7			
11	15	15					.8			Forerunners masked by microseisms.
12	16	10						25		
13	17	12					45			
14	18	1					.9			
15	19	23					.6			
16	20	2	34.5	38.9			43			Persia.
17	20	8	9.9	13 43			16			Barka.
18*	20*	17	9.9		13.9	20 23	39			Southeast of Philippines.
19	22	17					.0			
20	23	14					58			
21	23	21					.8			
22	24	17					.7			
23	27	16					.4			
24	27	19					56			Some preceding movement.
25	29	16					4			
	Febr.									
26	2	17					.4			
27	3	3					.5			
28	6	5					1.0			
29	7	2					.0			Preceding movement disturbed.
30	7	9	6 47	15 14	19.1	22.1			62	Kansu. Rather strong microseisms.
31	8	12			31.3	40 38	1.1			*SS* 47m.1. New Guinea.
32	10	18			24 5	27 20				*e* 37m.6; 42m.7; 48m.7.
										Masked by microseisms.
33	12	11	2 19	6.5	6 48		9			No Galitzin records. *P* quite small,
34	14	7					.9			[uncertain. South of Crete.
35	14	10					.4			
36*	15*	13	1.5		6 8	12 11				Banda Sea.
37	18	15					0			
38	18	20					.6			Faint.
39	21	1			35.4		.8			
40	21	6					.9			Small preceding movement.
41	21	15						.9		Faint.
42	21	17			17 22	24.8	.8			*PS* 26m.7; *SS* 32m.9. New Guinea.
43*	22*	15			52 0	52 50	1.7			Pacific south of New Zealand.
44*	22*	19			43.9	47.5	1.7			Aftershock.
45	24	7					37			
46	24	16						41		

København.

No.	Date	Hour	Forerunners P	Forerunners S			L	Un-defined	△	Remarks
	1936 Febr.		m s	m s	h m s	m s	h m	h m	°	
47	26	3					.5			Faint.
48*	27*	10			23 15	28 48				No Galitzin records $27^d 8^h$–$28^d 10^h$. Banda Sea.
49	27	17						.6		
50	28	3					.7			
51	28	17					.1			
52	29	9					17			
	March									
53	1	10			36.5	41 2*				i_N 41m46s.
54	1	10			64 41		1.4			Superposed on preceding shock.
55	2	3	*i*30 42	40 12	33 27	40 34	.9		74	*P*+. No *G*.E record. *SS* 45m.5. Yeso.
56	4	15					46			Small preceding movement.
57	4	17					48			
58	6	12						42		
59	6	14			45 11		1.6			*P'*+.
60	7	19					.4			Faint.
61	7	20			58.9		1.3			
62	8	1					.2			
63	8	2					.3			
64	8	10					.5			Faint.
65	10	8			33 56		.8			
66	10	12		26 15			.7			Aleutian Islands.
67	10	20	47 33	57 2*	50 17	*i*57 24	1.2		74	*P*+. Yeso.
68	11	0	55 40	65 25	58.5		1.4		76	*P*+. *S* uncertain, possibly earlier. Japan.
69	11	9					.1			Small preceding movement.
70	11	11					37			
71	11	15					57			
72	11	18					.0			
73	14	9			.3		1.4			Disturbed.
74	17	20		12 47			.6			Indian Ocean.
75	20	18			8.2		21			
76	20	19		9.6	10.3		.4			Central America.
77	21	0			12.8	15.5	.9			i_Z 16m6s; e_N 16m25s. Pacific Ocean.
78	21	2			*i*15 28	21.0	.5			Indian Ocean.
79	22	5						.1		
80	22	7					.4			Faint.
81	22	12			36 53	42.7	1.2			*SS* 53m.8; *SSS* 59m. Pacific Ocean.
82	22	23					.5			
83	24	16					53			
84	24	22					.7			
85	25	7					5			
86	25	8	46 58	51 14			53			North Atlantic Ocean. *P* and *S* small, the readings not certain.
87	25	9	4 3*	8 23	4 51	8 31	10		25	North Atlantic Ocean. 2. swing: *P* (+2.8,—7.3,—6.4).
88	25	11	38 17	42.7			44			North Atlantic Ocean.
89	25	20					.6			

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No.	Date	Hour	Forerunners P	Forerunners S	L	Undefined	△	Remarks
	1936 March		*m s*	*m s*	*h m*	*h m*	°	
90	25	23			64			Small forerunners.
91	26	3			17			
92	26	9			53			
93	27	2		29.9	1.1			Small preceding movement.
94	29	21		33 37	35			Greece.
95	29	23			.0			
96	31	3		55 45	57 40	1.3		*SS* 62m.8. No *G.* records; readings from *M-S.* E.

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NOTES

No. 4. Jan. 2. 22h. Sumatra; △ = ca. 85°. iP_Z condensation, followed by rather large oscillations. $e_{E,Z}$ 54m.8. *iS* 57m56s, large oscillations on *N* and *E*. *SS* 63m.8. *SSS* 68m.0.

No. 8. Jan. 14. 14h. Argentina; △ = ca. 105°. Deep focus. Masked by strong microseisms. $i_{N,E}$ 35m11s. $i_{N,E}$ 35m58s. $i_E e_{N,Z}$ 38m10s. *e* 42m.1; 44m.0; 47m.7. *L* small.

No. 18. Jan. 20. 17h. Southeast of the Philippines; △ = ca. 100°. *P* small, the reading not certain owing to microseisms. *PP* 13m.9. $iSKS_E$ 20m23s. *iSKKS* 20m50s, large on *N* and *E*. eS_N 21m.6. *iPS* 23m5s followed by *PPS*, not clearly separated from it. *i* 24m36s. e_E 26m.9. *SS* 28m.

No. 36. Febr. 15. 13h. Banda Sea; △ = ca. 110°. *P* 1m.5 small. P'_Z 5m28s. *PP* 6m8s large. *PPP* 8m.5. *SKS* 12m11s large. *SKKS* 13m.0. *PS* 15m31s very large, followed by large oscillations. *SS* 21m.2. *SSS* 26m.0.

No. 43. Febr. 22. 15h. Pacific south of New Zealand; △ = ca. 165°. P'_1 52m0s; P'_2 52m50s. *PP* 56m31s; *PPP* 60m.5. (*SKKS*) 62m46s; e_E 63m36s; 64m.2; 65m.2. *SKSP* 66m.4. *PPS* 70m30s. *SS* 76m.8. *SSS* 83m.6.

No. 44. Febr. 22. 19h. Aftershock to no. 43. Galitzin Z disturbed. e_E P'_2 43m.9. *PP* 47m.5; *PPP* 51m.2. (*SKKS*) 53m.8. *e* 54m.8. (*PPS*) 60m.7. *SS* 67m 7; *SSS* 74m.0.

No. 48. Febr. 27. 10h. Banda Sea; △ = ca. 110°. No Galitzin records. PP_Z 23m15s. Following readings from *M-S E*: *SKS* 28m48s; *SKKS* 29m47s; *S* 30m.4; *PS* 32m.1; *SS* 38m.2.

Seismometric readings: Notation

P— normal first preliminary tremors, longitudinal waves.
P+ — first wave condensational (away from the epicentre).
P— — first wave dilatational (towards the epicentre).
P (±a, ±b, ±c) — a, b and c are trace amplitudes in mm. of first swing on NS, EW and vertical component Galitzin records respectively. + indicates ground motion directed to N, to E or up, — indicates ground motion to S, to W or down. When a second set of amplitudes is given it refers to the second swing. If an amplitude is not measurable the number is replaced by x.
PP... — longitudinal waves reflected at the earth's surface.
S — normal second preliminary tremors, transverse waves.
SS... — transverse waves reflected at the earth's surface.
PS; *PPS*;... — waves reflected at the earth's surface which travel partly as longitudinal, partly as transverse waves.
SKS — waves which traverse the mantle as transverse waves but are refracted through the core with longitudinal oscillation.
PKS — waves which pass the mantle on one side of the core as longitudinal waves, on the other side as transverse waves and are refracted through the core with longitudinal oscillation.
SKKS — waves which traverse the mantle as transverse waves, are refracted through the core with longitudinal vibration and are reflected on its inner boundary.
L — long, or surface, waves; main phase.
M — waves of greatest amplitude in the surface waves.
i — sharply defined beginning of a phase.
e — gradual beginning of a phase.
△ — arcual distance from the station to the epicentre.
*) affixed to time of phase indicates that the beginning is in a time-mark.
*) affixed to number and date refers to Notes.

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$\varphi = 55°41'$ N. $\lambda = 12°27'$ E. $h = 13$ m.

Lithologic foundation: chalk.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1		μ^2	T	k
	cm	cm	sec			sec	
N	12.5	100	12.61		—0.11	12.2	104
E	12.5	100	12.65		0.08	12.1	104
Z	14.5	100	11.55	$^1/_4$—$^{22}/_4$	0.1	10	100

After $^{22}/_4$ Z was often readjusted and the constants varied somewhat.

Wiechert 1000 kg. vertical seismograph.

Wiechert 1300 kg. horizontal seismograph.

Constants:

Component	T	ν	ϱ	V
	sec		mm	
N	9.6	4.2	0.7	215
E	9.6	4.0	0.8	195
Z	5.4	4.1	0.2	165

Milne-Shaw seismograph, E component, with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.

Wood-Anderson torsion seismometer, E component, $T = 2^s.7$.

København.

No.	Date	Hour	Forerunners P	Forerunners S			L	Un-defined	△	Remarks
	1936 April		m s	m s	h m s	m s	h m	h m	°	
1*	1*	2	*i* 23 9		27 10	*i* 33 49	52			Pacific Ocean.
2*	1*	20	24 41		29.1	*i* 35 21	1.0			Pacific Ocean.
3	2	6			36 58	46.7	1.2			*SS* 53m.7. Pacific Ocean.
4	2	13					.0			
5	7	2					.9			Faint.
6	8	4		24.0			25			Greece.
7	9	1					.3			
8	9	16			70					Preceding movement masked by [microseisms.
9	10	17					.8			
10	10	20						30		
11	12	0			1.5	2.2	28			*e* 2m.7; 3m.6. East of Philippines.
12	12	3					.5			
13	12	17					.8			
14*	12*	21	5 0*		9 12	15 33	.6			Marianne Islands.
15	13	1					.4			
16	13	4					.0			Faint.
17	13	8					.7			
18	14	15						52		
19	14	17					.7			
20	15	7					.0			Faint.
21	15	16			10 38		13			
22	15	19			20.4	21.4	.8			
23	16	1			.4		.8			
24	16	10					.3			
25	16	14					10			Small preceding movement.
26	16	14					.8			
27	16	17					.1			Faint.
28	16	20					.9			
29	17	18					.7			Faint.
30	17	22		29 24			.6			Persia.
31	18	0					.9			
32	18	1					.9			
33*	19*	5	23		27 55	37 40	1.0			Solomon Islands.
34	19	9	15 52	25 17	30.5	34.0	.7		73	*P*—. Andaman Islands.
35	21	2					.3			
36	21	2		28 52			.6			Persia.
37	22	10	9 4	17 24			.4		61	Disturbed. No *G.* records. Atlantic Ocean.
38	23	23	25 58*	35 34	30.6		.8		75	South of Aleutian Islands. Deep focus.
39	24	13					.8			Faint. No *G.* records.
40	25	5					.5			
41	26	9			.2		.7			
42	27	0	10 2	19 3	23.8	26.5	.5		69	Disturbed.
43	27	1	*i* 44 20				68			China.
44	27	4					.2			*P*+.
45	27	6					.3			
46	27	6		53.6	59.0		1.2			
47	27	13					.6			Gulf of Honduras.
48	28	1					45			Faint.

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No.	Date	Hour	Forerunners P	Forerunners S			L	Un-defined	△	Remarks
	1936 April		m s	m s	h m s	m s	h m	h m	°	
49	28	6			0.5	17.3	.6			
50	28	14						.5		No *G.* records.
51	28	17					.3			
52	28	18	38 19				1.1			China.
53	28	23	20 5	23.9					21	
54	29	9					.5			Disturbed.
55	29	17			16.6		33			
56	30	11					.6			
	May									
57	1	18					.3			Faint.
58	3	2					.9			»
59	3	3					.7			»
60	4	4					.7			
61	4	8					.8			
62	4	19					.1			Faint.
63	5	20			12.9	19.5	.7			
64	6	4			2 25	3 35				
65	6	19					28			
66	7	2				7.6	15			
67	7	21			.7		.8			
68	8	1					.6			
69	8	9			34 6	36.7				Preceding movement disturbed.
70	8	15	35 18		44 17		1.0			China. *P* quite small.
71	8	17			40 50	42.1				
72	9	6					.5			
73	9	7					.9			
74	10	6					.5			
75	11	10					.1			
76*	11*	17			46 17	47.8	1.4			East of New Guinea.
77	11	21					.5			
78	13	11					.9			No *G.* records.
79	14	6					.3			
80	14	17					.5			Faint.
81	16	7	*i* 16 40	25 37	19 4	30.3	38		68	*P*+. No *G.*Z record. China.
82	17	11					.6			
83	17	15						34		
84	17	17	41 5		43.8		46			Rumania. *P* quite small, uncertain.
85	19	0					.7			
86*	19*	7			42.5	46 4				
87	19	16			40.2		47			
88	19	16						50		
89*	19*	21			8 59	15 2*				
90	19	21			41.0					Superposed on preceding shock.
91	19	21	43 19		54 0					Superposed on preceding shock. Indian Ocean.
92	20	0			39 15	40 15	1.0			Indian Ocean.
93*	20*	3			24.3	26 19	1.0			Solomon Islands.
94	21	3					.9			

København.

No.	Date	Hour	Forerunners P	Forerunners S			L	Undefined	△	Remarks
	1936		m s	m s	h m s	m s	h m	h m	°	
	May									e_E 44m.6. No G.Z record. Argentina.
95	22	0			40.8	42.8	1.1			South of New Hebrides.
96	22	23			40 40	43 43	1.4			
97	23	20					.2			
98	25	3			32.3	38 23	1.0			
99	25	14					.4			
100	26	13			10.2		1.2			
101	26	18						15		Faint.
102*	27*	6	*i* 28 56	*i* 36 46	31 4*	40 33	47		56	Himalaya.
103	28	0						41		
104	28	12					1.2			Faint preceding movement.
105*	28*	19			5.8	13.1	30			Pacific Ocean off Mexico.
106	30	7			33		46			
107	30	15			58					Small.
108	31	3						57		Faint.
	June									
109	1	11			*i* 40 27	43 3*				*P'*—; large on *Z*. *e* 47m.0. Deep focus.
110	2	14					.2			
111	3	3	7 9	16.6	17.2		.5		73	Kurile Islands.
112	3	9	27 14	37 11			48		79	No *G*. records. Pacific off California.
113	3	10			36.1					Superposed on preceding shock.
114	4	13					51			
115	5	14			56.3	61 29	88			No *G*.E and Z records. *e* 62m51s. *SS* 69m.8.
116	6	7					.7			
117	6	16			37 27		45			
118	7	4	2 47	6 11			7		19	*P*—. Greenland Sea.
119	7	4	42 20	45 40			47		18	*P*—. Greenland Sea.
120	7	11					33			
121	7	18					8			
122	8	9					.4			
123	9	0					.6			
124	9	16	49 19		59 44	59 57	1.3			*P*—. Sumatra.
125	10	3					28			
126	10	3	37 43	44 33			.9			*P* quite small, uncertain. Baluchistan.
127*	10*	8			41 50	43 12	1.2			New Guinea.
128	10	15					.1			
129	10	17			26.6		.6			
130	10	19			2.4	7 7	10			
131	11	9			59		1.2			
132	11	13					.9			
133	12	16					.7			
134	13	0	*i* 37 56	42 11			46		24	*P*—. Mediterranean Sea.
135	13	9					.9			Faint.
136	13	22					.4			»
137	14	2	38 35	47.4	47 41	48.2	1.0		66	*P*+. Kamchatka.
138	14	6					37			
139	14	10	8 39				14			Greenland Sea.
140	14	17	6 52	11 18			14		25	Asia Minor.

København.

No.	Date	Hour	Forerunners P	Forerunners S			L	Undefined	△	Remarks
	1936		m s	m s	h m s	m s	h m	h m	°	
	June						22			
141	15	8								
142	16	0			53	56	1.7			No *G*.Z record.
143	16	15					.9			
144	16	19					.7			Faint.
145	18	15	6 40				.5			Himalaya.
146	19	16	45 32	54 18	55 30		1.2		66	*P* and *S* quite small. Burma.
147	20	5					.4			Faint.
148	20	6	38.6	43.7			47			Atlantic Ocean.
149	20	7					39			
150	20	8		36.5			41			Atlantic Ocean.
151	20	14	7 48	11 40			14		22	*P*+.
152	20	20					2			
153	21	7					.4			Faint.
154	22	0					.3			No *G*. records.
155	22	19	37 14	45 36	46 13	49.4	52		62	No *G*.Z record. Atlantic Ocean.
156	23	0					.1			
157	23	17			40 28		46			
158	23	18			54 37		60			
159	24	4	12 15	18.5					41	*P* quite small. Turkestan.
160	25	17		*i* 12 58			.6			Japan.
161	27	3	*i* 27 41	31 58				33	24	*P*+. Off Iceland.
162	27	21	25 4	34 34			.8		74	Japan.
163	28	8		33.1			.9			East of Japan. *P* about 22m.8, not certain.
164	28	18					.1			
165*	29*	14	37 51	44 0*	39 5	39 40			40	Afghanistan.
166*	30*	15	*i* 17 55	*i* 26 59	20 31	31 36		37	52	Off Kamchatka.
167	30	19	33 35	39 37	35 6	35.6			39	*P*—. *PS* 39m46s. *SS* 42m.3 Afghanistan.

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NOTES

No. 1. April 1. 2^h. Pacific Ocean east of Philippine Islands; △ = ca. 100°. No Galitzin *Z* record. *iP* 23^m9^s, condensation; *e* 23^m23^s. *e* 26^m48^s; *PP* 27^m10^s. *PPP* 29^m21^s; 29^m43^s. e_N 31^m16^s; $e_{N,E}$ 31^m54^s. e_E 32m.4. *iSKS* 33^m49^s. *SKKS* 34^m30^s. *S* 35^m9^s. *PS* 36^m0^s; *PPS* 36m.9. *SS* $41^m.3$.

No. 2. April 1. 20^h. Pacific Ocean east of Mindanao; △ = ca. 100°. P_Z 24^m41^s. *PP* 29m.1. i_E *SKS* 35^m21^s; e_E 36^m16^s. *PS* 37^m38^s. Later phases not clearly marked. *L* not large.

No. 14. April 12. 21^h. Marianne Islands; △ = ca. 100°. P_Z 5^m0^s, in time-mark. e_Z 8^m51^s, small. *PP* 9^m12^s; *PPP* 11^m23^s. *e* 14m.5. *SKS* 15^m33^s. *PS* 18m.2 followed by large oscillations. *SS* 24m.0; *SSS* 27m.6.

No. 33. April 19. 5^h. Solomon Islands; △ = ca. 125°. *P* quite small, uncertain. *P'* 26^m16^s small. *PP* 27^m55^s large, followed by large oscillations; *e* 28^m46^s; 29^m24^s. Continued, rather strong oscillatory movement; e_E 34m.0. PS_N 37^m40^s; e_E 37m.9 large. *SS* 44^m; *SSS* 49m.5.

No. 76. May 11. 17^h. East of New Guinea; △ = ca. 120°. *P'* 46^m17^s small. *e* 47m.2; *PP* 47m.8. *e SKS* 53m.3; e_E 53^m34^s. *SKKS* 54^m57^s. *PS* 57m.7; *PPS* 59m.0. *SS* 63m.9. *SSS* 68m.5.

No. 86. May 19. 7^h. Deep focus. No Galitzin *Z* record. e_E 39m.5 small, uncertain. e_E 42m.5. e_N 46^m4^s. e_E 47m.6. e_E 51m.5. *L* small.

No. 89. May 19. 21^h. Molucca Islands; △ = ca. 110°. No Galitzin *Z* record. PP_Z 8^m59^s, *e* 9^m8^s. *SKS* 15^m2^s; *SKKS* 15^m57^s; S_n 16^m32^s. *PS* 18m.0. *SS* 24m.3; *SSS* 28m.2. Forerunners of an other shock superposed on *L*.

No. 93. May 20. 3^h. Solomon Islands; △ = ca. 130°. No Galitzin *Z* record. P'_Z 24m.3. *PP* 26^m19^s. Continued irregular movement, phases not clearly marked. e_N 40^m45^s. *SS* 43m.4.

No. 102. May 27. 6^h. Himalaya. *iP* (x,—2.8,+3.6). P_cP_Z 30^m2^s. *PP* 31^m4^s; *PPP* 32^m16^s. P_cS 34^m0^s, *iS* 36^m46^s. e_N 38m.2. iS_cS 38^m46^s unusually clearly marked. SS_E 40^m33^s; SSS_N 42m.2. L_Q 47m; L_R 50m.

No. 105. May 28. 19^h. Pacific Ocean off Mexico; △ = ca. 100°. *PP* 5m.8. (*SKKS*) 13m.1. e_N 13m.8. (*PS*) 14m.8; (*PPS*) 15m.2. *SS* 20m.2. L_Q 30m. L_R 34m.

No. 127. June 10. 8^h. New Guinea; △ = ca. 120°. Deep focus. No Galitzin records. Wiechert *H* disturbed. e_Z 41^m50^s quite small. *P'* 43^m12^s. *PP* 43^m48^s. *SKS* 49^m50^s. *PS* 54^m1^s (in time mark). *e* 59m.2; 60m.3.

No. 165. June 29. 14^h. Afghanistan. Deep focus. *P* 37^m51^s, condensation. *i* 37^m53^s large. e_N 38^m17^s. *e* 39^m5^s and *PP* 39^m40^s large on *E* and *Z*. e_N 39m.5. $e_{E,Z}$ 40^m16^s. $e_{E,Z}$ 40^m42^s large. *S* 44^m0^s, not large. e_E 44^m56^s; 45^m25^s. e_N 45m.6. *SS* 47m.4, very large on *E*. *L* small.

No. 166. June 30. 15^h. Off Kamchatka. Very strong record. *P* (—4.5,—2.0,+8.6). i_Z 18^m8^s very large. *PP* 20^m31^s. *PPP* 22^m15^s. *iS* 26^m59^s very large on *E*; i_N 27^m18^s large on *N*. e_E 28^m24^s. e_E 31m.0. *SS* 31^m36^s very large on *N*. SSS_N 35m.1. e_Z 45^m52^s.

BIANCO LUNOS BOGTRYKKERI A/S
KØBENHAVN

No. 39. 1936.

Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

Bulletin

of the seismological station

KØBENHAVN

φ = 55°41′ N. λ = 12°27′ E. h = 13 m.

Lithologic foundation: chalk.

No. 39. July—Sept. 1936.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1	μ^2	T	k
	cm	cm	sec		sec	
N	12.5	100	12.61	—0.06	12.5	102
E	12.5	100	12.65	0.08	12.4	102
Z	14.5	100	11.55	0.3	11	94

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component	T	ν	ϱ	V
	sec		mm	
N	9.7	4.4	0.7	215
E	9.8	4.3	0.8	195
Z	5.9	4.6	0.2	155

Milne-Shaw seismograph, *N* (from $^{19}/_8$) and *E* components, with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.

Wood-Anderson torsion seismometer, *E* component, $T = 2^s.7$.

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No.	Date	Hour	Forerunners P	Forerunners S			L	Undefined	△	Remarks
	1936 July		m s	m s	h m s	m s	h m	h m	°	
1	1	17					.4			Seismic?
2	2	13					.3			
3	2	14					.9			
4	2	23					.9			
5	3	3			17 55	19.9	.9			*PKS* 21m18s. *SKKS* 26m.7.
6	3	21					43			
7	4	9			16.7	17 37	.8			No *G.* records. Disturbed.
8	4	9	9 27	19.6						» » » »
9	5	15					.2			
10	5	17					.8			
11*	5*	19	8 49		12 51	19.4	.7			Celebes Sea.
12	6	2					.8			
13	6	18			45.8	54.0	1.2			
14	8	20					.5			
15	9	3					1			
16	9	17					.7			
17	10	3			15 20		17			
18	10	19			57.4		1.4			
19	11	18					.7			
20	12	3			1 48	12.5	1.0			
21*	13*	11	26 27		30.7	37 15	56			Chile.
22	13	20					.2			
23	14	11					.2			
24	14	18					48			Iceland.
25	14	23					.2			
26	15	2	6.9	17 1*			.6			*P* uncertain. Japan.
27	15	12		13.1			.6			
28	16	7					.8			
29	18	18					.5			
30	19	3			0.6		.4			
31	21	0			19 4		.6			
32	21	5						.0		
33	22	6			38 19		1.7			
34	22	9					.4			
35	23	6			39 37	40 14				Preceding movement disturbed.
36	23	7	17 54	28 13					83	
37	23	19								East of Japan. Superposed on pre- [ceding shock.
38*	26*	7	51 8				.8			
39	27	10			55 26	57 49	1.3			Chile.
40	27	21					.4			
41*	28*	5			38 0*	40 31	1.2			Off New Guinea.
42*	28*	8			12 12	14 46	.9			» » »
43	30	15					.3			
44	30	19								
45	31	18			4 36		40			
							.4			
	Aug.									
46	1	6		43.7	47.7	51.0	56			Kansu.

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No.	Date	Hour	Forerunners P	Forerunners S			L	Undefined	△	Remarks
	1936 Aug.		m s	m s	h m s	m s	h m	h m	°	
47	1	8					.8			
48	2	1						11		
49	2	18	25 48	29.9			34		23	Asia Minor.
50	2	20					33			
51	2	22	45 46	49.5			52		21	Aegean Sea.
52	3	4		10.6			14			Asia Minor.
53	4	14		32 31			.8			North of Luzon.
54	7	22			12.1		.5			
55	8	4	17 54	22 0*			24		23	Creete.
56	8	12					.0			
57	9	16					.8			
58	10	6			40 46		46			
59	12	22	29 4	33 6	32.5		36		23	Aegean Sea.
60	13	11					.3			
61	13	16					55			
62*	13*	20	16 6		20 2*	26 39	.8			Mindanao.
63	14	12					.8			
64	14	20					.8			
65	14	21						54		
66	14	22	48.4		58 54	59.8	1.4			*PS* 60m.9. Pacific Ocean.
67	15	2			47 58	54.0	1.6			
68	15	5			49.4		1.7			
69	16	8					52			
70	16	14					.7			
71	16	17					.3			
72	16	21		51 17			1.1			Persia.
73	17	6			18 10		22			
74	17	6			34 3		1.6			
75	17	14			20		1.0			No time-marks.
76	17	18					.0			
77	17	18					.8			
78	18	3					.0			
79	18	7	20 8	31.1	23 36		.8		91	Pacific Ocean off Mexico.
80	20	2					26			
81	20	23	40 38	47 5	42.4	50.5			43	Fergana.
82	21	13					.2			
83	21	15					.6			
84*	22*	7	3 53	14 1*	7.0	20.1	32		81	Formosa.
85	22	11	21 37	31.8			.9		81	Formosa.
86	23	20	57 38	67.1					73	*P*+. Indian Ocean.
87*	23*	21	*i* 24 26	34 29	*i* 24 48	35 30			80	Sumatra.
88	24	22			41.6	42 27				*PP* 45m33s. *SS* 64.m6. West of New [Zealand.
89	25	20					.1			
90	26	11		56.1			1.3			Kurile Islands region.
91	26	21			48.1	54.1	1.1			
92	27	3						27		Faint.
93	28	0		31.4			.6			Persia.
94	28	2					.9			Faint.

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No.	Date	Hour	Forerunners P	Forerunners S			L	Un-defined	△	Remarks
	1936 Aug.		m s	m s	h m s	m s	h m	h m	°	
95	28	6			59 33		1.7			
96	28	22					25			
97	29	2			31 1		34			
98	29	13					.1			Disturbed.
99	29	20					.2			
100	29	22		39 43			.9			No *Z* record. Arabian Sea.
101	30	17					.9			
	Sept.									
102	2	9					.9			Disturbed.
103	2	12					13			
104	2	13	17 51	22.7			27			Caucasus. *P* and *S* uncertain,
105	3	5			29.5		51			[masked by microseisms.
106	3	12			42 21	45 54	1.6			
107	3	15					.6			
108	3	20			14 38		.6			
109	3	22					9			
110	4	8	22 6	32 24	33 34	37.4	.9		83	Pacific Ocean southeast of Tokyo.
111	5	5					.2			Faint.
112	5	22					.7			Small preceding movement.
113	6	4			55.3		56			Rumania.
114	6	6			3.7		7			
115*	6*	17			59 12	69 24	1.9			Pacific Ocean.
116	7	3					3			
117	7	8					.1			
118	7	9					.3			
119	7	12			46 35	52.5	1.3			
120	8	17					.2			Strong microseisms.
121	12	16					12			
122	12	18			21.4		39			
123	13	4						6		
124	14	14					16			
125	15	14					4			
126	16	9			42 0		.7			Forerunners disturbed.
127	17	8					.3			
128	17	18					.6			
129	18	18	50 59	61 20*	62 51	66.7	81		83	Japan.
130	19	1	*i* 14 16	*i* 24 40	25 23*	25 45	.6		84	*P*—. *SS* 30^{m}1. Sumatra.
131	19	6		53 16			1.2			Sumatra.
132	19	15			4 11		33			
133	20	11					8			
134	21	11	45 55	49 30	*i* 49 40	52.5	54		20	Black Sea.
135	21	12	31 40	35 15	*i* 35 25		40		20	» »
136	21	13					22			
137	21	16					21			Iceland.
138	21	16					35			»
139	21	17					38			
140	21	18					19			Iceland.

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No.	Date	Hour	Forerunners P	Forerunners S			L	Un-defined	△	Remarks
	1936 Sept.		m s	m s	h m s	m s	h m	h m	°	
141	21	20					39			Iceland.
142	22	12	1.6	5 1			9			Black Sea. *P* quite small, uncertain.
143	24	20					14			Faint.
144	24	21					.5			»
145	25	1					.5			»
146	25	13	5 29	15 10	20.3		24			Pacific Ocean. P and *S* small un-
147	29	16			55 25		1.7			[certain.

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NOTES

No. 11. July 5. 19^h. Celebes Sea; $\triangle$ = ca. 100°. *P* 8^m49^s, condensation. *PP* 12^m51^s. e_E $17^m.1$. *SKS* not very well defined, $19^m.4$. 19^m55^s a large oscillation. *PS* $22^m.0$.

No. 21. July 13. 11^h. Chile; $\triangle$ = ca. 105°. No Galitzin *Z* record; the beginning of other records slightly disturbed. *P* 26^m27^s, small. *PP* $30^m.7$; increase of movement 30^m59^s. *SKS* 37^m15^s; *e* 37^m27^s larger. *e* 38^m15^s; e_N 38^m48^s. PS_E 40^m8^s; e_N i_E 40^m31^s, large on *E*. *SS* $40^m.2$.

No. 38. July 26. 7^h. Chile; $\triangle$ = ca. 105°. *P* 51^m8^s, dilatation. *PP* 55^m26^s; *PPP* 57^m49^s. e_E $59^m.3$. SKS_E 61^m47^s; $SKKS_E$ 62^m46^s. S_N 63^m3^s. *PS* 64^m45^s, large on *E*. PPS_E 65^m42^s. *SS* 70^m37^s.

No. 41. July 28. 5^h. Off New Guinea; $\triangle$ = ca. 115°. *PP* 38^m0^s; *PPP* 40^m31^s. SKS_E $43^m.6$. S_E 45^m45^s. *PS* 47^m39^s. *SSS* $58^m.5$.

No. 42. July 28. 8^h. Off New Guinea; $\triangle$ = ca. 115°. *PP* 12^m12^s; *PPP* 14^m46^s. *SKS* 18^m9^s. *S* 20^m4^s. *PS* 21^m54^s.

No. 62. Aug. 13. 20^h. Mindanao; $\triangle$ = ca. 100°. No Galitzin records. *P* 16^m6^s, small. *PP* 20^m2^s. e_E 23^m44^s; 24^m40^s. *SKS* 26^m39^s; (*S*) 27^m27^s. *PS* 28^m36^s; *PPS* $29^m.3$.

No. 84. Aug. 22. 7^h. Formosa. *P* 3^m53^s, dilatation. *e* 4^m11^s; 4^m48^s. *PP* $7^m.0$; *PPP* $9^m.0$; *PPPP* $10^m.2$. S_E 14^m1^s, S_N 14^m6^s. *e* 15^m9^s. *SS* $19^m.0$; e_E $20^m.1$ larger. *SSSS* $25^m.4$.

No. 87. Aug. 23. 21^h. Sumatra. Some depth of focus. No Galitzin *Z* record. *iP* large on *E* and *Z*, condensation. *i* (*pP*) 24^m48^s. *e* $29^m.6$; $30^m.3$; $31^m.0$. *S* very large on *N*. e_E 35^m30^s large. *SS* $39^m.5$. *L* not very large, the beginning uncertain.

No. 115. Sept. 6. 17^h. Pacific Ocean; $\triangle$ = ca. 150°. P_1' 59^m12^s, large on *Z*; e_N 59^m24^s. *e* 65^m42^s. *SKKS* 69^m24^s. *SKSP* 72^m46^s. *SS* $81^m.0$. *SSS* $86^m.2$.

BIANCO LUNOS BOGTRYKKERI A/S
KØBENHAVN

No. 40. 1936.

Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

Bulletin

of the seismological station

KØBENHAVN

φ = 55°41′ N. λ = 12°27′ E. h = 13 m.

Lithologic foundation: chalk.

No. 40. Oct.—Dec. 1936.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1		μ^2	T	k
	cm	cm	sec			sec	
N	12.5	100	12.61		0.0	12.4	102
E	12.5	100	12.65		0.05	12.1	104
Z	14.5	100	11.55	$^1/_9$—$^{20}/_{10}$	0.35	10	95
				$^{20}/_{10}$—$^{29}/_{12}$	0.25	10	95
				$^{29}/_{12}$—$^{31}/_{12}$	0.1	9	95

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component	T	ν	ϱ	V
	sec		mm	
N	9.4	4.1	0.7	210
E	9.5	4.2	0.6	195
Z	5.7	4.0	0.3	160

Milne-Shaw seismograph, *N* and *E* components, with the approximate constants T = 12^s ν = 20 V = 300.

Wood-Anderson torsion seismometer, *E* component (until Nov. 16), T = $2^s.7$.

Benioff seismograph, *Z* component (from Dec. 3), T = 1^s; T_1 = $^1/_4{}^s$.

København.

No.	Date	Hour	Forerunners P	Forerunners S			L	Undefined	△	Remarks
	1936 Oct.		m s	m s	h m s	m s	h m	h m	°	
							53			Austria.
1*	3*	15		52 29	52 46		39			East of Mindanao.
2*	3*	22	4 2		14 33	15 29	57			
3	4	7								Pacific Ocean.
4*	5*	0			13 25	17.3	1.1			
5	5	6			33.0	39.4	1.0			
6	5	7					.9			
7*	5*	9	58 14	69 57			92			East of Mindanao.
8	7	3					45			
9	8	4					15			
10	9	18					.6			
11	9	19						.9		
12	10	2					8			
13	10	3			32 33	40.4	1.0			
14	12	8						26		
15	13	7					.5			
16	14	23					.6			
17	15	22					.2			
18	16	12					.9			
19*	18*	3	12 26				15			Italy.
20	18	17					.0			
21	19	6					54			
22	19	7					11			
23	19	7					33			
24*	19*	12			22 55	29 11	.9			Moluccas.
25	20	22			24 28		33			
26	21	2			16 29	19.9	.5			
27	21	6					.4			Faint.
28	21	14					45			
29	22	4			17 43		.5			
30	22	11					.0			
31	22	23	53 44	57 14	57 36		58			*S* quite small, uncertain. Iceland.
32	23	0	4 32	8 2	8 23		9			Superposed on preceding shock.
33	23	3			56.1		1.0			[*S* not certain. Iceland.
34*	23*	6	*i* 34 43	43 9			55		62	Alaska.
35	23	17					.0			
36	23	20			11.6		.8			
37	24	14	10 54	14 43			18		21	Creete.
38	24	16					.8			
39	25	15	42 26				1.2			
40	26	19			55.7	56.7	1.3			*P* small, uncertain, masked by [microseisms.
41*	26*	23	*i* 9 44	13 3			14		18	Jan Mayen.
42	29	6			16.5		.5			
43	29	18		64 1	56 58	62 56	1.4			*PS* $65^m.5$. *SS* $71^m.1$.
	Nov.									Marianne Islands.
44	1	17								
45	2	9					10			
46	2	15	*i* 9 15	18 35	27.0		.7			Disturbed.
							32		72	*P*+. Kurile Islands.

København.

No.	Date	Hour	Forerunners P	Forerunners S			L	Undefined	△	Remarks
	1936 Nov.		m s	m s	h m s	m s	h m	h m	°	
47*	2*	20	57 48	67 32	*i* 60 41	72.3	79		76	Japan.
48	3	5					.3			
49	4	20					.1			Faint.
50	9	6					.9			
51	10	13					.4			
52	10	17					.2			
53	10	17					.8			
54	11	1					20			
55	11	17			26.0		35			
56	12	2					1.1			Small preceding movement.
57	12	5					.2			
58	12	9					20			
59	12	20	*i* 15 59	25 10	25 55		.7		70	
60	13	0					.4			
61*	13*	12	42 16*	51 13*	44 46	55.7	58		68	Pacific Ocean off Kamchatka.
62	14	1					.7			
63	14	5					.6			Faint.
64	14	10					.1			Masked by microseisms.
65	14	14	40 31				1.1			*P* quite small.
66	14	19	39 15*				1.0			*P* quite small. No Galitzin records.
67	15	22			*i* 8 57					
68	15	22	32 1				1.0			*P* small, uncertain.
69	18	2					11			
70	18	15	54 45	58 32	58 47		61		21	Asia Minor.
71*	19*	21	23 0	33 29	26 17	39.1	47			Guatemala.
72	21	22					.5			Faint.
73	22	18	32.0	42.5	48.1		1.0			Guatemala. Strong microseisms.
74	24	14					.0			
75	25	11	55.2	64 43			1.4			Kurile Isl. *P* quite small, uncertain.
76	26	2	24 38		35 10	35 51	.8			Costa Rica. No Galitzin *E* record.
77	28	12					.1			
78	29	4					37			
79	29	7					15			
80	29	9					.5			Disturbed.
81	29	23					33			
	Dec.									
82	1	0			4.6		.7			Strong microseisms.
83	1	6		30.3			.9			» » . Japan.
84	7	22					.2			Faint.
85	8	10					.4			
86	8	11					.2			
87	13	21			48.5	57	81			*SS* $63^m.2$. Marianne Islands.
88	14	4					.8			Preceding movement masked by
89	20	3					.4			Strong microseisms. [microseisms.
90	21	19					.7			Very strong microseisms.
91	21	20					.1			Very strong microseisms.
92	25	20					.8			

København.

No.	Date	Hour	Forerunners P	Forerunners S	L	Un-defined	△	Remarks
	1936 Dec.		*m s*	*m s*	*h m s*	*m s*	*h m*	*h m*	°	
93*	26*	23			*i* 12 22	16 16	1.0			Kermadec Islands.
94	27	0	26 50				.9			Japan. Superposed on preceding [shock.
95	27	2					.9			
96	28	18					.1			
97	29	14						45		
98	29	15			8.0	17.7	.7			*SS* 24m.4. East Indies. Disturbed.
99	30	4					.9			

København.

NOTES

No. 1. Oct. 3. 15h. Austria. First forerunner quite small, the beginning not certain. eS_E 52m29s. e_N 52m46s. *L* 53m.4.

No. 2. Oct. 3. 22h. East of Mindanao; △ = ca. 100°. *P* quite small, masked by microseisms; the reading not certain. *PP* 8m10s. *SKS* 14m33s. (*SKKS*) 15m29s. *PS* 16m53s. e_N 18m.1. *SS* 22m.6.

No. 4. Oct. 5. 0h. Pacific Ocean; △ = ca. 155°. P'_Z 13m25s; 13m52s; 14m17s. *PP* 17m.3. *SKSP* 27m.4. e_E 32m.6. *SS* 37m.1.

No. 7. Oct. 5. 9h. East of Mindanao; △ = ca. 100°. P_Z 58m14s, condensation. *PP* 62m9s; 62m28s larger. *SKS* 68m52s. *S* 69m57s. PS_E 71m21s; PPS_E 72m30s. e_N 74m.7. e_N 76m.4. SS_E 77m.2. SSS_E 80m.8. L_E 92m.

No. 19. Oct. 18. 3h. Belluno, Italy. P_Z small, 12m26s. e_N 13m57s; e_E 14m10s. $(S)_{N,E}$ 14m35s, clearly marked. *L* 15m.0.

No. 24. Oct. 19. 12h. Moluccas; △ = ca. 105°. *PP* 22m55s. *SKS* 29m11s. *PS* 32m3s; *PPS* 33m8s. SS_N 37m.8.

No. 34. Oct. 23. 6h. Alaska. *iP*, condensation. *PP* 37m4s; *PPP* 38m.6. eS_N 43m9s; S_E 43m15s. *e* 44m.6; i_E 44m57s large. *SS* 47m.6; *SSS* 50m.3.

No. 41. Oct. 26. 23h. Jan Mayen. *iP* 9m44s, first movement quite small. eS_E 13m3s, not very clearly marked. eS_N 13m11s well defined.

No. 47. Nov. 2. 20h. Japan. *iP* (—7.2, —4.0, +13.0). *e* 58m8s. *iPP* 60m41s; *PPP* 62m26s. *S* 67m32s; followed by several oscillations; phases not clearly separated. *SS* 72m.3. *SSS* 76m.0.

No. 61. Nov. 13. 12h. Pacific Ocean off Kamchatka. *P*, seemingly at end of time-break, 42m16s (—3.5, —1.1, +4.8; +8.2, +2.7, —12.8). *e* (P_cP) 42m40s. *PP* 44m46s; *PPP* 46m24s. (P_cS) 46m51s large on *N*. S_E 51m13s and S_N 51m21s large. *PS* 51m40s. $(S_cS)_E$ 52m24s. e_N 53m12s; e_E 54m35s. *SS* 55m.7 large on *N*.

No. 71. Nov. 19. 21h. Guatemala; △ = ca. 85°. *P* 23m0s, condensation. *PP* 26m17s; 26m36s. *e* 33m19s. *SKS* or *S* 33m29s. *SS* 39m.1; *SSS* 43m.3.

No. 93. Dec. 26. 23h. Kermadec Islands; △ = ca. 160°. No Galitzin *Z* record. iP'_Z 12m22s. *PP* 16m16s. e_N 21m26s. e_E 23m.2. e_N 25m.6, 32m.3. *SS* 35m.5.

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